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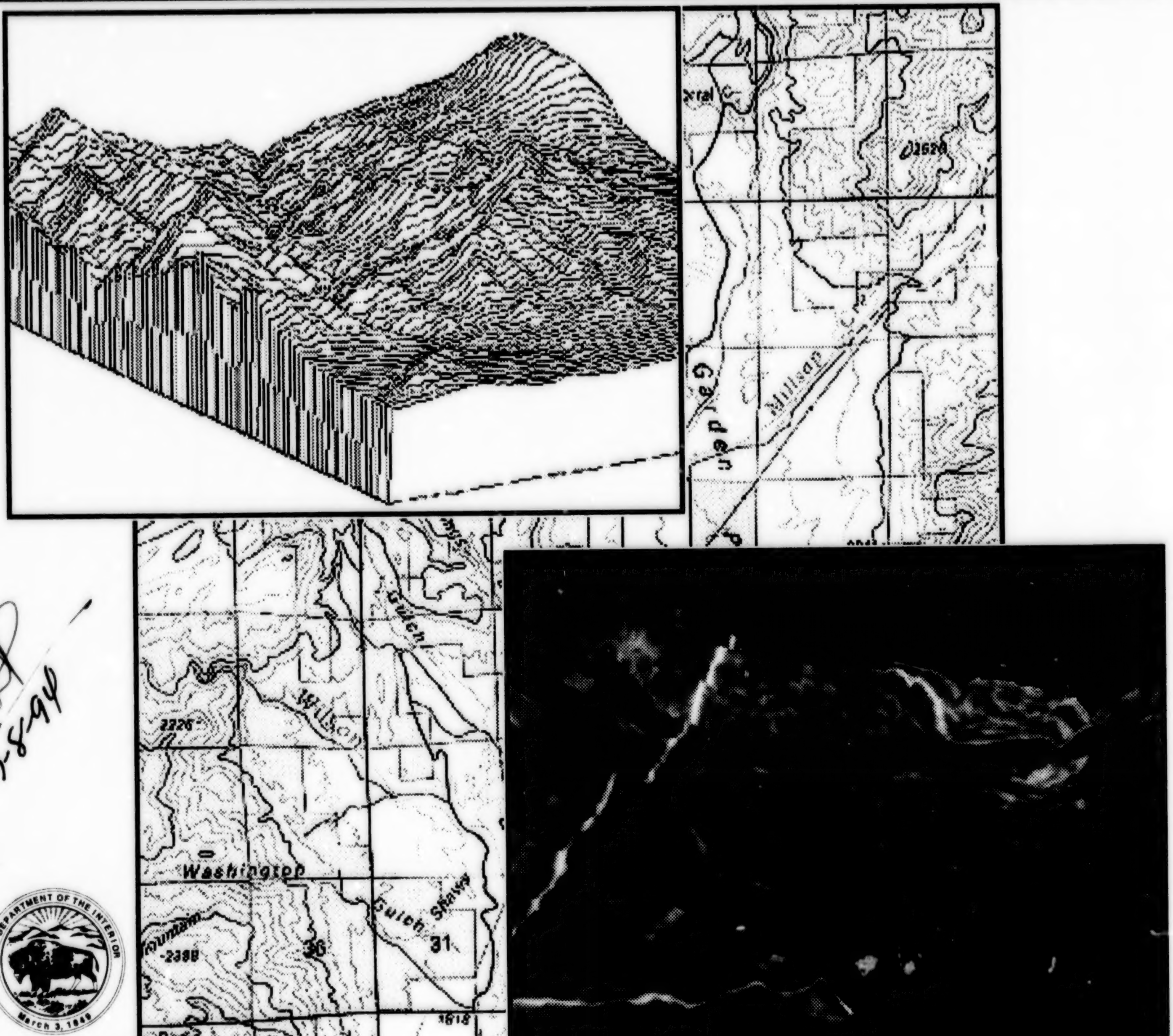
MAPPING SCIENCES SUMMARY

1992



3-8-94

Pub 94002381

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Acknowledgements

We wish to extend our sincere appreciation to the many persons who assisted in the production of this summary. Special recognition is appropriate for Pam Clemmer and Debra Carter, from the Service Center Branch of Mapping Sciences, whose efforts at various stages of the development of this document were critical. The Technology Transfer Staff at the Service Center, especially Linda Hill and Janine Koselak, also provided significant assistance during the design, editing, and layout of the document. Finally, the mapping sciences leaders in the Washington Office, State Offices, and at the Service Center are gratefully acknowledged for their support and contributions to the summary.

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Introduction

Mapping sciences are an integral part of the Bureau of Land Management's (BLM's) resource management programs. The products and services provided by Mapping Sciences staffs at all levels of the BLM organization are critical to the success of many of the agency's priority programs. As BLM implements further modernization activities over the upcoming years, maintaining and enhancing the quality of our basic data themes will require the best efforts of our mapping professionals.

The primary intent of this document is to summarize some of the major activities and services provided by mapping professionals in support of the BLM mission. This document includes references to the use of Geographic Information Systems tools where they were applied to assist in the completion of assigned mapping products (digitizing, data analysis, plotting, etc.). There are many other resource applications of Geographic Information Systems that are not listed. Depending upon comments received, future editions may include a broader selection of Geographic Information Systems applications.

This summary is written in an informative, narrative style rather than as a tabular or numerical report. Most of the activities discussed within this summary relate to work accomplishments during fiscal year (FY) 92. It is hoped that this summary will foster a better understanding of the wide array of mapping-related products and services available to support resource management activities.

Since this document is the first of its kind, constructive comments pertaining to format or content would be greatly appreciated. A preaddressed comment form is provided on the last page of this document.

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Washington Office

Headquarters Activities

Interagency Initiatives - The 1990 revision to the Office of Management and Budget (OMB) circular A-16 resulted in the formation of the Federal Geographic Data Committee (FDGC) and the Interior Geographic Data Committee (IGDC). The responsibilities of these two groups are to ensure the coordination of spatial data activities. Representatives to the FGDC are no longer limited to mapping personnel, but have expanded to personnel from every resource program involved in spatial data activities. Mapping personnel, however, were instrumental in developing the "base data initiative." This multiagency initiative for the collection of base map data was proposed by the Washington Office based on requirements developed in a study of BLM mapping activities. The BLM proposal was coordinated with the IGDC, FGDC, and OMB to incorporate the benefits of other efforts, such as the digital orthophoto initiative proposed by the Department of Agriculture. The proposal did not result in an increase in funding for FY 94; however, the U.S. Geological Survey (USGS) will program approximately $5 million in FY 94 funds for Department of the Interior (DOI) priorities. The DOI budget task force initiative required BLM to participate in identifying functions within mapping and Geographic Information Systems that can be more efficiently shared and/or coordinated among bureaus. The outcome of the initiative was the formation of multiagency task forces to develop a clearinghouse, establish metadata standards, formulate DOI policy for Geographic Information Systems and mapping activities, and support the base data initiative. The National Academy of Sciences will shortly publish a report concerning the coordination of mapping and spatial data activities in the Federal Government. BLM participated in the study through briefings and written reports. Copies of the report will be furnished to the states as soon as they are printed.

Dave Meier

DOI Audit - During FY 92, DOI conducted an audit of BLM's mapping activities. The auditors' definition of mapping differed from that of BLM's; therefore, many of the recommendations related to more efficient use of minicomputers in BLM. The recommendations directly affecting mapping were to: (1) include mapping in the management control review process, (2) develop an annual report and ensure its completion each year, and (3) establish controls for digitizing base quadrangle map data. BLM is complying with the recommendations and, during FY 93, will conduct a review of mapping sciences activities and develop an annual report. Further, with regards to digitizing, the Geographic Sciences Policy requires BLM to meet established standards.

Mapping Sciences Workshop - The FY 92 Mapping Sciences Workshop resulted in a number of actions. The Washington Office appreciates the concerted efforts of all Service Center and State Office personnel who participated in this workshop. Individual efforts from many of the representatives have resulted in: (1) the rewrite of the BLM 9160 Manual, (2) publication of the disclaimer and the Geographic Sciences policies, (3) completion of a soon-to-be-released digitizing handbook, (4) review of a Bureauwide policy for the use of datums, and (5) identification of the need to more closely coordinate the publication of base mapping with USGS.

National Recreation Map - The Washington Office participated in the design, development, and publication of the first multiagency, national-level recreation map. This map has been a huge success with the public and will shortly be reprinted.

National Aerial Photography Program - BLM has funded this program at the level of $250,000 yearly for several years and is an active member on the steering committee. BLM has been instrumental in refining the technical characteristics of this program, most recently in encouraging the use of Global Positioning Systems to establish more precise camera station parameters. The National Aerial Photography Program will provide the source materials for the proposed digital orthophoto quarter-quad program, and for updates to BLM's resource base data. The Washington Office has also worked closely with the Service Center in the acquisition of a significant data base of System Probetroire d' Observation del la Terre (SPOT) imagery.

Program Overview

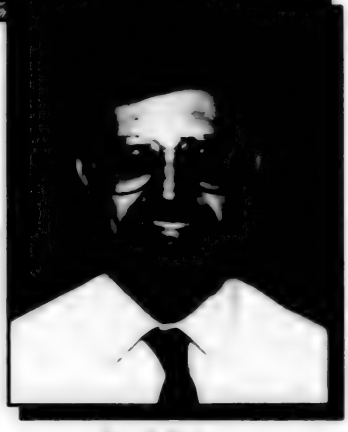
What will be expected of BLM mapping sciences in the future? Trends are for the increased cooperation and sharing of data, compliance with data standards, broadening of applications with improvements in technology, and management of ecosystems. Of these, the concept and implementation of ecosystem management may prove the most challenging. Traditional areas of management would change dramatically not only with respect to areal boundaries, but also with respect to the collection, analysis, and display of information. The emphasis on technology sharing by the new administration may help to provide some of the answers. New improvements in technology are likely to become available for BLM's use within 5-8 years. It is safe to assume also that the Federal Government will, in the next 3-5 years, have an active and significant digital program to populate a national data base. BLM's base data initiative has drawn the attention of high level officials. These developments will place heavy demands on mapping sciences expertise and services in the future.

Service Center

Cartography

1:100,000- and 1:500,000-Scale Mapping - During FY 92, the Cartography Section revised 50 maps at 1:100,000-scale (100k). Based upon input provided by the State Offices, the Section schedules five such revisions per State per year. Sixty 100k reprints required by the State Offices were also completed. The 100k Compilation and Specification Procedures were revised. The collar information outside the map body for the 100k map series was automated through use of the Microstation software package and the large-format flatbed plotter for final plate separation generation. Geographic Information Systems capabilities were used to automate production of boundaries and subsequent symbology and unique character placement pertaining to the 100k map series. The North Dakota 500k, Wyoming 500k and 1,000k, and Nebraska 500k maps were also completed.

Automation Support - Map scanning and precision plotting support for internal production requirements and assistance to State Office operations were provided. Development of scanning applications has focused on maintaining an ownership data base to support the Bureau's 100k mapping program. This development will support other activities, such as the 500k and the 1:1 million-scale map series and special projects that incorporate ownership data. In addition to supporting Service Center mapping programs, the scanner system provides efficient data capture services that support BLM's State and District Office requirements.



Fred Batson

Special Mapping Support - Several special projects were completed during FY 92, including: the National Recreation 2000 map (in cooperation with the Oregon State Office), the California State Recreation 2000 map (in cooperation with the California State Office), development of a digital 100k Progress Index, a digital BLM Resource and District Area Boundaries file, ten State Wilderness Revisions, six California Off-Highway Vehicle reprints, and developmental work for digital production of the New Mexico 500k map.

Photogrammetry

Engineering Site Plans - The Photogrammetry Section provided large-scale topographic mapping support for 19 recreation site development plans.

Cadastral Boundary Support - During FY 92, the Photogrammetry Section dedicated a significant portion of its resources to the Arkansas River riparian project in support of the New Mexico State Office. This multiyear project, which has required extensive photogrammetric assistance, is scheduled for completion in February 1993. Two additional projects were also completed: MoKan (Squaw Island) on the Missouri River and a Salmon River boundary study in Idaho.

Digital Elevation Models - Training was provided to BLM State personnel on implementing Line Trace Plus capabilities at local levels. This training was provided in support of the Bureau's workshare agreement with USGS for Digital Elevation Model production, for which the Photogrammetry Section has the administrative lead.

Special Projects - The Green River, Utah, vegetation prototype study, which used large-scale photography along five zones to develop and test an intensive riparian monitoring method for the Moab District Office, was initiated. In support of the Wyoming State Office, an archaeological base map was completed in the New Castle Resource Area. This engineering-scale base map was created by using modern locational techniques and terrestrial photogrammetric procedures. UTM coordinates produced from the base map (Whoop-Up Canyon) will be used for precise location of archaeological field data.

Capability Enhancements - To enable direct compilation of data from the Zeiss stereoplotters into AutoCAD format to support site planning activities, a Zeiss/Phocus to AutoCAD/DXF translator was configured on a second Zeiss P3 analytical plotter.

Remote Sensing

State Assistance - The Remote Sensing Section provided various types of assistance to states, including: creating a mosaic of data from 3 arc-second Digital Elevation Models for Utah and California; conducting a viewshed analysis along a portion of the Oregon Trail in eastern Wyoming; generating a false-color composite of the Western U.S. from a biweekly National Oceanic and Atmospheric Administration Advanced Very High Resolution Radiometer (AVHRR) data set; converting California image plot files (128 image maps) and delivering them to the California State Office; assisting the Utah State Office with an update of the Fire Fuels data base; working with NASA personnel at Moffet Field, California, to investigate the cost and feasibility of acquiring high-resolution photography for the entire state of Nevada; generating image plot products in support of an Ecological Site Inventory course conducted in Elko, Nevada, and Montrose, Colorado. Aerial photography contract administration (10 contracts), archival, and lab support were provided to all offices.

Local Image Processing Support - Telephone hotline support was provided for BLM personnel who have local image processing capabilities in field offices. Image processing workstations were installed and configured at the Eagle Lake Resource Area in Susanville, California, at the New Mexico State Office, and at the Utah State Office during FY 92.

Minerals Management Support - Support for the classification, mapping, and analysis of an area in Elko, Nevada, was provided, including: data acquisition, edge-enhancement and stretching of the data, plotting of 16 quad-image maps, and development of a program to mask out areas of noninterest. Two procedures were compared for detecting areas of change between different dates.

Soils Premapping and Inventory Enhancement - Support was provided for a Utah project, including: generating a variety of plot products, obtaining satellite imagery covering Sagers Wash, Utah, and processing both the Moab and Westwater, Utah, 100k data sets. Detailed specifications and field verification of spectral products tor the Hanksville study were completed.

Hazardous Materials Management Support - Landfill evaluations were conducted on the closed landfill in Vale, Oregon, and on the landfill in Oroville, Washington, and data entry and gridding were initiated on the Lee Acres landfill project in New Mexico. A subscene was extracted from a thematic mapper image for the identification of abandoned uranium mines near Grants, New Mexico. A presentation of available technology was given at BLM's annual Hazardous Materials Conference in Phoenix.

Training - Introduction to Remote Sensing Applications (9160-1) was conducted twice in Reno, Nevada. Basic Aerial Photo Interpretation (9160-2) was conducted in Worland, Wyoming, in June. Basic Aerial Photo Interpretation was conducted as part of the 2000-18 Beginning Realty course at the Phoenix Training Center in March. A remote sensing briefing was presented as part of the 1737-4 Riparian Wetland Ecological Site Classification course in Montrose, Colorado, in July.

Alaska

Cartography

Patent Plan Process - BLM plays a major role in the conveyance of lands in Alaska. This is an ongoing comprehensive program that requires the involvement of the survey and conveyance processes. The final product of the survey process is the automated production of survey plats via computers using AutoCAD software. The digital data created is a combination of hydrographic, geographic, and survey data. The Branch of Mapping Sciences, Alaska State Office, produces an average of approximately 500 original plats of survey yearly, as well as an additional 450 townships which are input into digital format based on approved survey data.

Geographic Coordinate Data Base Project - The Geographic Coordinate Data Base is in the process of being collected. It will be a computerized data set consisting of latitude/longitude coordinates, and accompanying descriptive data, for all surveyed or protracted corners of the National Public Land Survey System. The creation of the Geographic Coordinate Data Base will provide a common reference system for tying together ownership and use records, natural resource data files, and base maps. The Geographic Coordinate Data Base will form the base layer of an automated Land Information System, a tool to enhance BLM's ability to perform its mission of managing the Nation's public lands.

Alaska's initial Geographic Coordinate Data Base collection effort is being performed as a project through a private contractor working in-house with the BLM staff. They are using BLM's Data General computer system and the Alaska Hydrographic Digitizing System software. The work consists of inputting coordinates, survey bearings and distances, and descriptive data; performing coordinate geometry computations; digitizing water boundaries; and segregating this data into accessible files. To date, over 2,945 townships have been processed, and over 1,812 have been finalized and accepted.

Gus Panos

Forty-Mile River Revision - Inaccurate depiction of the 40-Mile Wild and Scenic River on Master Title Plats made it impossible to accurately depict the 1-mile corridor withdrawn from mineral entry. The Branch of Mapping Sciences revised the hydrography from high-altitude aerial photographs. The Title and Land Status Section digitized the hydrography from the photo-revised manuscripts, protracted the land net grid, and calculated the protracted land and water acreages around existing small tract surveys using the LOT function in the Alaska Hydrographic Digitizing System. A custom software system called the Subliminal Line Imaging and Map Extraction System, developed in the Title and Land Status Section, was used to generate 11 revised protraction diagrams. An automated map annotation function similar to that found in the Map Overlay and Statistical System was used to automatically generate lot and section annotation. The hydrography, survey, protracted land net, and map annotation data were combined to create the revised protraction diagram. One hundred sixty-four base Master Title Plats were then created from this protraction diagram data.

Unsurveyed Hydrography Project - As part of the Geographic Coordinate Data Base Project, the Title and Land Status Section has digitized hydrography from 656 photo-revised inch-to-the-mile bases. Mapping Sciences provided the photo interpretation. This data represents the hydrography data base for unsurveyed lands and will be used to generate revised protraction diagrams and more accurate Master Title Plats. The data is windowed and edge-matched to further finalize it in preparation for the Bureau's target system. Approximately 3,100 townships have been completed to date. Associative source map attributes have been collected in formatted ASCII text files. Using LOT in the Alaska Hydrographic Digitizing System, the protracted land net grid, land and water acreages are generated and will be used to help derive Legal Land Description information sometime in the future. The Alaska Hydrographic Digitizing System is the primary mapping software used.

Land Status Collection Project - The Title and Land Status Section has digitized unsurveyed, metes-and-bounds-described, land status from Master Title Plats using the Alaska Hydrographic Digitizing System. This will augment the Master Title Plat graphics that will eventually be generated from the Land Information System. Attributes are collected, matching land status and boundaries to case serial numbers, thus ensuring compatibility with Land Information System when this data is loaded into the Bureau's target system. This project is presently suspended until a more efficient data collection software can be found. Maintenance of existing data continues.

Protracted Township Corners - The Title and Land Status Section has completed a concerted effort to check and correct the existing protracted township corners data base. This data base contains the protracted latitude and longitude coordinates for every township corner in the state. This data base is heavily relied upon by Bureau personnel for automated mapping operations.

Photogrammetry

Purchase of New Analytical Stereoplotter - The Branch of Mapping Sciences purchased two Zeiss P3 Planicomp analytical stereoplotters to replace the two Matra Traster analytical stereoplotters. The purchase also included CADMAP and Plus III Terrain Modeling software. The first Zeiss P3 was delivered and software installed last winter. The second will be installed in fiscal year 1993.

Dillingham/Aleknagik - Twenty-four orthophotographs were produced to aid in a survey of land parcels subdivided by aliquot part. The area to be surveyed is along the road between the towns of Dillingham and Aleknagik in southwest Alaska. This survey is part of the Alaska State Office's land conveyance program. Ground control was established by the BLM's surveyors using the Global Positioning System. Aerial photographs at 1:15,840 scale were acquired. Orthophotographs were produced by the Branch of Mapping Sciences, Alaska State Office, using the Matra Traster analytical stereoplotter and the Zeiss Z2 orthoprojector.

Campbell Tract - Twenty-three base maps for engineering site plans were produced for the BLM Environmental Education Center in Anchorage, Alaska. The Center will be near the Anchorage District Office in the BLM Campbell Tract. Ground control was established by BLM surveyors. Aerial photographs at 1:3,000 scale were acquired. Existing roadways and facilities, and 1-foot contours were mapped by the Branch of Mapping Sciences, Alaska State Office. Mapping was done in the CADMAP system. These are the first line maps produced with the Branch's new Zeiss P3 analytical stereoplotter.

Dalton and Steese Highways - The Branch of Mapping Sciences, Alaska State Office, acquired aerial photographs at 1:3,000 scale for eight sites along the Dalton Highway and the Steese Highway in the Arctic and Steese/White Mountain Districts. Ground control was established by BLM engineers. The sites are proposed for tourist-related enhancements such as wayside facilities, campgrounds, and trailheads under funding of the Intermodal Surface Transportation Efficiency Act of 1991.

Orthoquads - The Branch of Mapping Sciences produced 10 orthoquads for the Service Center. This production is in support of the Bureau's Memorandum of Understanding with USGS concerning lower 1:24,000 orthoquad production.

Remote Sensing

Lightning Activity/Fire Management - Lighting strikes are the most common cause of wildfires in Alaska. The Alaska Fire Service continues its yearly analysis of lightning strikes in its Initial Attack Management System. Lightning strikes are detected by nine receiving stations placed throughout the state. The information is automatically fed to a computer that performs triangulation to locate the strike. This information may be displayed or plotted. There may be 2,000 lightning strikes daily. Each lightning strike is analyzed against factors such as weather, soil moisture, and ground cover to determine the probability of fire. The fire manager decides whether initial attack is needed.

Waterfowl Habitat Mapping - Progress has been made on waterfowl habitat mapping on BLM lands in Alaska. This has been an ongoing project for 4 years through an agreement with Ducks Unlimited, Inc. Benefits have resulted through using their proprietary software and analysis approach. Approximately 15 million acres have been analyzed using LANDSAT Thematic Mapper data. During fiscal year 92 work was begun on an additional 5 million acres on the Alaska Peninsula in cooperation with the U.S. Fish and Wildlife Service. The data has been shared with U.S. Fish and Wildlife Service and the State of Alaska, Department of Fish and Game. Much of the data is useful in inventorying wetlands/riparian habitat. Drought conditions in the pothole region of the Plains and Midwest resulted in a significant increase in waterfowl populations in Alaska during 1990-1992. Habitat management was complemented by this data.

Arizona

Cartography

Wilderness Related Mapping - With the final passage of the Arizona Desert Wilderness Act of 1990, individual wilderness area maps were produced/maintained at various scales (mosaicked USGS quads were used as the base). Using this "master set" of wilderness maps, wilderness boundaries were digitized into the Geographic Information System. This digital data was used by the Service Center to produce/update wilderness area color separation plates for the 1:1,000,000 Arizona wilderness status map. The Service Center's Kongsberg plotter was used to produce peel coat color separation materials directly from digital data. This digital wilderness boundary data was used in-house to contribute to the production of numerous graphic products requiring the accurate location of wilderness boundaries at various scales.

Recreation Management - The Arizona State Bureau of Land Management (BLM) recreation map, part of the *Arizona Recreation Guide*, was manually designed and drafted. Multiple plates were produced showing the required cultural and natural features. A special base plate was obtained from USGS showing the physical relief of the state. Several regional enlargement maps were also prepared using both manual and Macintosh computer techniques. This material was sent to the Service Center for color separation and final cartographic work. A variety of maps were produced (using a combination of manual and automated cartography) to brief congressional staffers on Arizona's potential Wild and Scenic Rivers. Intermediate materials were prepared using the Cartographic Output System software and the Calcomp 1042 pen plotter, an in-house camera, and manual methods. Final products included 64-page briefing books for the participants and a dozen foam-core-mounted display maps (in the 3 to 5-foot size range) for use in the briefing and for future public meetings.

Dave Wilson

Resource Management Plans - Because resource personnel are using the Geographic Information System to assist them in developing Resource Management Plans, the Arizona cartography staff supports their efforts by producing digital base maps using the Cartographic Output System. These digital base maps are used to produce high-quality electrostatic plots, or to produce the color separation materials (peel coats, scribes, negatives) required for a printed map product. Maps produced include the Gila Box Riparian National Conservation Area, Ehrenberg-Cibola Special Recreation Management Area, Shivwitz Resource Area map, the Bill Williams River Interagency Project map, and the Kingman Planning Area Resource Management Plan. Digital data is input from stable base USGS quads, Global Positioning System technology, Line Trace Plus/scanning technology, and USGS Digital Elevation Model and Digital Line Graph data. The cartography staff has been active in working with field Geographic Information System users and the Mapping Sciences personnel to improve the professional appearance and quality of Geographic Information System products. This has been done by working with field personnel in cartographic layout and data input using the Automated Digitizing System/Map Overlay Statistical System/Cartographic Output System, and by coordinating with BLM Mapping Science policy makers in an effort to encourage BLM cartography staffs to support their Geographic Information System users.

Digital Elevation Model and Digital Line Data Production - Arizona BLM has two Line Trace Plus workstations for Digital Elevation Model production in support of resource analysis. USGS contour plates are scanned by the Service Center, loaded on tape, and sent to Arizona in raster format for input to Line Trace Plus. As a by-product, the resulting vectorized and labeled contour line files are saved. These digital contour line files are exactly like the original contour plate linework, and are used in digital base maps. Working through the Service Center, negotiations are presently underway for USGS to provide this digital line file when they deliver a Line Trace Plus-produced Digital Elevation Model through the BLM-USGS cost-share program.

Remote Sensing

Wilderness Management - The Yuma District has been contracting 1:12,000-scale natural color aerial photography for the newly designated BLM wilderness areas within the District. The Service Center is assisting in the contracting. The entire state of Arizona was flown for aerial photography in 1992 under the National Aerial Photography Program. The cartography staff is actively involved in making this aerial photography available to the Resource Areas and in providing training assistance in aerial photo interpretation and mensuration with assistance from the Branch of Remote Sensing at the Service Center.

California

Cartography

Henry Wolter

Resource Management Plans - Resource Management Plans have been completed for the Bishop, Hollister, Redding, South Coast, and Arcata Resource Areas. The California Recreation 2000 map was also completed, with the help of the Service Center. The number one priority continues to be the wilderness mapping effort. Wilderness Study Area base mapping for northern and southern California has been completed.

East Lassen Integrated Vegetation Management Plan - Base map preparation and digitization at 1:24,000 scale for 24 data layers at 70 quads per layer have been completed.

Other Projects - The Sacramento, Red Bluff, Tehachapi, and Stockton 100k maps were reprinted. The Cow Mountain Recreation Plan map was also completed.

Photogrammetry

Digital Elevation Models - With the Service Center's help, editing of two Digital Elevation Models in support of the East Lassen Integrated Vegetation Management Plan was completed. The editing was done at the California State Office on the Line Trace Plus workstation.

Remote Sensing

Landsat Thematic Mapper Imagery - Landsat Thematic Mapper imagery was used to produce a detailed vegetation map of the Integrated Vegetation Management Plan area for the Susanville District. Color infrared aerial photography is also being used extensively in support of the field's verification and accuracy assessment efforts.

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Colorado

Cartography

Wilderness Study Areas - In support of Colorado's Wilderness Study Area program, 126 maps at a scale of 1:24,000 were generated and distributed to a variety of Colorado Congressmen, environmental/conservation groups, and District and Resource Area personnel. The data was captured using the Bureau of Land Management's Geographic Information System software, the Automated Digitizing System/Map Overlay Statistical System, plotted on the Calcomp pen plotter, then overlaid onto USGS's 7-1/2-minute quadrangle maps. All of the additional Wilderness Study Area map-specific text was generated on the Macintosh. This information was then photographically combined in the photo lab to produce the final map product. Preliminary planning to generate approximately 30 Wilderness Study Area brochures as recreational guides for these areas was also begun.

White River Resource Management Plan - In FY 92, a five-color map was produced at a scale of 1:200,000 for the White River Resource Area's Resource Management Plan. The Automated Digitizing System was used to collect the data in the District Office, while in the State Office, the Map Overlay and Statistical System was used to create the output files. The Map Overlay Statistical System files were quality checked using the Calcomp electrostatic plotter. They were then sent to the Kongsberg plotter at the Service Center to generate the color-separate negatives and peel coats.

Royal Gorge Resource Management Plan - The last of the Resource Management Plans for the State of Colorado will soon be finished. Currently, three four-color maps are planned to be produced at a scale of 1:250,000 in support of the Royal Gorge Resource Management Plan. The same procedures as those for the White River Resource Management Plan will be used. The State Office, with the addition of three part-time temporary digitizers, provided digitizing support for this Resource Management Plan.

Theresa Ely

1:100,000-Scale Maps (100k) - The color proof review for three 100k maps was completed and the color separation overlays for four 100k maps, which are scheduled for printing in FY 93, are currently being prepared. Some of the data was collected in the Automated Digitizing System and plotted through the Map Overlay Statistical System; however, most of the compilation is being performed manually. The Service Center will complete the generation of color separation negatives. The marginal information and the interior section numbers are produced at the Service Center using Intergraph's Microstation software.

Miscellaneous Digitizing Projects - In June 1992, three part-time temporary digitizers were hired to assist with a variety of BLM projects. Watershed boundaries and high-water flood zones were digitized for approximately 50 quads in support of the Arkansas River Basin project; data was digitized in support of the Mexican Spotted Owl inventory project from approximately 50 quads; and one soils project was completed (two more are planned for FY 93), using Line Trace Plus, in which the Service Center scanned over 100 soil survey quads on its Tangent scanner. This digital data was then edited in Line Trace Plus and output in the Digital Lines Graph 3 format.

Master Title Plats - Approximately 20 Master Title Plats were generated within AutoCAD using theAutomated Plat System.

Big Game Habitat Maps - Several small-scale maps (about 1:2,000,000) are currently being produced for the Big Game Management Strategy Plan (a national plan) depicting the distribution of various species throughout the Western United States and Alaska. These maps will be produced entirely through traditional manual cartographic methods. This project is expected to be completed by the end of June 1993.

Colorado River Brochure - A 38-page, four-color waterproof brochure for river recreation was produced. Manual cartographic methods, graphics and text from a Macintosh, and AutoCAD were used to produce this product.

Location Map for Western Slope Fire Center - This map was produced entirely in AutoCAD and plotted on a Calcomp pen plotter.

Remote Sensing

Colorado River Project - During the summer of 1992, the Colorado State Office requested the assistance of the Service Center's Remote Sensing Section in planning a photo-acquisition mission using the recently acquired OV-10 aircraft, which is maintained by the Aviation Headquarters Group out of Boise, Idaho. The objective was to collect aerial photography in support of river riparian vegetation studies, recreation management, and fire planning along the Colorado River. The mission was begun on August 8 and completed on August 9. The film was processed and titled by the WAC Corporation in early September. In spite of some minor vignetting problems, this project (Aviation Headquarters Group's first operational use of the large-format aerial camera) was a success.

Eastern States

Geographic Information Systems

Oil and Gas Maps - The State Office provides mapping support for the oil and gas program. Maps in the data base are constantly being updated to show parcel locations, case numbers, and disposition inside the townships. New maps are also being added through digitizing. Approximately 70 oil and gas maps were produced at a scale of 1:31,680. Available resources such as U.S. Forest Service maps, USGS topographic maps, and Bureau of Land Management Cadastral Survey Plats are being used as base maps. The oil and gas maps are sold to the public upon request.

Printed Materials - During FY 92, the Jackson District Office made tremendous strides in meeting BLM's goal to move toward total office automation (a paperless office). Geographic Information System technology has been used successfully to enhance the production and quality of printed materials. The District has taken a lead role in Geographic Information System at Eastern States and is committed to providing support to the Eastern States' programs that apply this technology to maps, Environmental Impact Statements, Resource Management Plans, BLM publications, and other documents.

Drainage Project - The Drainage Project, undertaken by the Jackson District Office, requires that an estimated 350,000 wells in the 11-state region be reviewed for potential drainage by the end of FY 95. While this requirement seems reasonable, it becomes difficult because Master Title Plats for Eastern States were never created. The only plats of survey or maps available to identify potential drainage within Eastern States are the Cadastral Survey, Plat of Survey, or the USGS 7-1/2-minute topographic map. Neither of these products are available statewide in digital format. Cadastral Survey automated the survey plat in 1987, and the coverage of the USGS digital data is very limited in the Eastern United States. Statewide coverage of the Arkansas Digital Line Graph data was purchased along with data produced from the General Land Office Project. Arkansas Digital Line Graph data is currently being used as a Public Land Survey System base for the Drainage Project. The process for creating a base map (township/range) has been completely automated using Bureau-developed software.

Resource Management Plan - During a Resource Management Plan short course held in Milwaukee, Wisconsin, the week of May 11-15, 1992, the decision was made to apply Geographic Information System technology to Resource Management Plans for the States of Florida and Michigan. Unlike the drainage project, BLM regulations did not dictate the scale of the base Public Land Survey System (1:24,000 or 1 foot = 2,000 feet). This office contacted USGS as to the availability of digital data for the States of Florida and Michigan at a scale of 1:100,000. Coverage through USGS for Michigan digital data is very limited and categories are incomplete. However, digital data for the State of Florida was available on a statewide basis. In June 1992, the Jackson District invested in available Florida digital data through USGS. The total cost was less than $3,500 for seven data categories, which are in Digital Line Graph format and at a scale of 1:100,000. Prior to the identification of issues in the planning process, the Geographic Information System Staff will have electronically reformatted the Digital Line Graph data and provided the Resource Management Plan team access to the Map Overlay Statistical System projects containing all purchased digital data for the State of Florida.

R.D. Bailey Lake Project - In January 1992, R.D. Bailey Lake, a Corps of Engineer project in southwestern West Virginia, was selected as a pilot project to explore the feasibility of automating the mapping process for the Milwaukee District Office drainage program. Data requirements were identified and paper copies of USGS quads, Digital Line Graph boundary information, and digital well data for the R.D. Bailey Lake Project were obtained. The project boundary was digitized in-house from multiple Corps of Engineers segment maps using the capture routines of BLM's automated digitizing system software. The end result of the digitizing effort was employed as the base map upon which Digital Line Graph administrative boundary information and well data were overlain using the Map Overlay Statistical System portion of the software. The final product was an automated map containing the R.D. Bailey Project boundary, internal tracts, and oil and gas wells. A Map Overlay Statistical System routine (PTPOLY) was attempted in order to identify tracts within 745 feet (a drainage measure) of wells; however, this procedure did not work satisfactorily. Analysis of potential drainage situations was accomplished visually by a geologist using the automated map. Work for this project was completed during May 1992.

Idaho

Cartography

Memorandum of Understanding - Another 105 USGS 7-1/2-minute quads were added to BLM's Memorandum of Understanding with the USGS Western Mapping Center for joint production of Digital Line Graphs and orthophotos. Through its contractor, BLM is delivering 105 quadrangles of Digital Line Graph data that meets USGS specifications and will be entered in the National Digital Cartographic Data Base. USGS, in turn, will produce (for delivery during FY 93) 105 new orthophoto quads, using the new National Aerial Photography Program photos in Idaho as a source.

Cost-Share Project - Idaho also entered into a small cost-share project with the Western Mapping Center to bring existing digital profile data in the Coeur d'Alene District up to full Digital Elevation Model specifications. Data was received and loaded onto the Prime computer.

Recreation Maps Completed - The Shoshone District recreation map was completed and published this year. Additionally, the Medicine Lodge Resource Area recreation map was completed. After final quality control edits are made and corrected, this map will be scheduled for printing.

Bill Yeager

Status & Wilderness Maps Revised - The 1:500,000- and 1:1 million-scale state maps were updated and reprinted with appropriate status changes. There are five 1:100,000-scale (100k) surface status maps that were revised this year: Glenns Ferry, Idaho City, Sun Valley, Riggins, and Kooskia. Once printed, the customer will quickly notice a new look to Idaho's 100k map series. Now included are recreation sites, interior section numbers, and spot elevations in both feet and meters. The 1:1 million-scale wilderness map was also revised this year.

Special Purpose Thematic Mapping - Several thematic maps were produced this year. Bruneau, Snake River, and Jarbidge Resource Area maps at 1:100,000-scale were completed. Also finished were maps for the Challis and Bennett Hills Resource Management Plans, the Idaho Isolated Wildlife Tracts brochure, the Boise Front Off-Road Vehicle brochure, a wilderness study review, and the Emigrant Trails book.

Photogrammetry

Aerial Photos - Aerial photo flights were completed over several recreation sites. The photogrammetry work, including contour mapping, is being done at the Service Center.

Remote Sensing

Cyclical Photography Program - Idaho's cyclical photography program continued. The Jarbidge Resource Area (Boise District) was flown in natural color at 1:24,000 scale (approximately 4,000 square miles). Resource managers were pleased to see the new photography, since the previous photos were taken in 1976.

Critical Riparian Areas Flown - Additionally, approximately 300 miles of streams in critical riparian areas statewide were successfully flown using false color infrared at 1:48,000-scale (1:12,000 scale along the Snake River).

South Fork Project - Work continued on the South Fork Project (Idaho Falls District), in which digital image processing (GRASS) is being used to help update the location of the actual river channel.

Montana

Cartography

1:500,000 State Status Map - The Dickenson, North Dakota District will have a 1:500,000 state status map for the first time. The work has been completed and the map has been sent to the printer. The map is the result of a combined effort of State and Federal agencies, the Montana BLM State Office, and the Service Center.

Montana Recreation Access Guide Maps - The Montana State Office has completed the Billings/Bridger/Powell map. The map is at the printer and will be available to the public in the summer of FY 93. This is the third map in the Montana Recreation Access Guide Map series to be published. Produced on the 1:100k base, the map includes recreation information and photos of area highlights, and features international symbols for site locations.

Wilderness Study Areas - The State Office completed 37 area maps at 1:24,000 scale with complete legal land descriptions. The legal land descriptions were prepared by the Cadastral Survey Branch for Washington Office use in establishing new Wilderness Areas.

Chuck Sigafoos

Resource Management Plan/Environmental Impact Statement Mapping - Mapping was completed by the State Office for the Miles City District's Big Dry Resource Area. The maps were produced on 1/4-inch-to-the-mile bases compiled for the District's oil and gas Environmental Impact Statement. The 1:100k bases were spliced for these bases. Four-color processing was used on reduced 1:100k bases to display the oil and gas information.

Geographic Information System Support

Theme Digitization - Base themes digitized in FY 92 by the State Office Geographic Information System Staff total nearly 1,800 themes from 7-1/2-minute quads. Assistance is given to the Districts when required for capture of resource data themes.

Oil and Gas Field Map Project - The Oil and Gas Field Map Project entails the digitization, storage, and display of basic oil and gas data through the use of the Geographic Information System. The project objective is to replace manually maintained oil and gas field maps with an automated system capable of plotting draftsman-quality maps at user-defined scales. At a minimum, oil and gas field maps contain the following digitized themes: land lines, lots, leases, communitization agreements, participating areas, compensatory royalty agreements, field boundaries, gas storage agreements, and wells. Oil and gas wells are displayed as symbols with descriptive information depicted alongside. The Dickinson District completed 12 oil and gas field maps in FY 92, and the Lewistown District completed 15.

Other Geographic Information System Projects - The Butte District is using Geographic Information System technology for the Dillon Resource Area Resource Management Plan, Granite Butte Elk Study, Bata Mountain Project, and Headwaters Resource Area Forestry Project, which are ongoing projects for FY 93. The Dickinson District completed the Tracy Mountain Sheep Study Area in FY 92. The Lewistown District is using Global Positioning System and Geographic Information

System technologies for the Judith, Valley, and Phillips Resource Management Plans; Prairie Dog Town; Arrow Creek Project; and Upper Missouri Wild and Scenic River Project. The Miles City District is working to combine Global Positioning System data with Geographic Information System data for the Cherry Creek Dam Cooperative Project, Pryor Mountain Wild Horse Range Project, and B&C Grazing District Project.

National Interagency Fire Center (NIFC)

Remote Sensing

Lightning Activity/Fire Management - Lightning strikes are the most common cause of wildfires. BLM's fire program continues its yearly analysis of lightning strikes with the Initial Attack Management System. Lightning strikes are detected by remote lightning sensors located throughout the 11 Western States. The information is automatically fed to a position analyzing computer at BLM/NIFC that calculates the position of the strike using one of several algorithms including triangulation, base line, and optimization. The lightning location data is then transmitted to Remote Interactive Graphics Systems located at 75 fire dispatch centers that currently make up the Initial Attack Management System in the lower 48 States.

The lightning locations are presented geographically on the Remote Interactive Graphics System monitor. As many as 50,000 lightning strikes may be detected during a typical summer day. The lightning strike information is analyzed against factors such as weather and fire fuels to determine the probability of fire. Fire managers then decide whether initial attack is required.

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Nevada

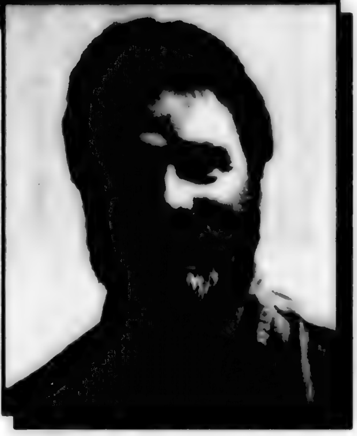
Cartography

Black Rock/High Rock Proposed Natural Conservation Area - Draft legislation is being prepared for the Black Rock Desert/High Rock Emigrant Trail Natural Conservation Area, which would encompass approximately 1,700,000 acres of public lands, including as many as 775,000 acres that would be permanently withdrawn from mineral entry to protect the integrity of the historic viewshed. The project is a cooperative effort between BLM's Nevada State Office, Winnemucca District Office, California Surprise Resource Area Office, and a public natural conservation coalition.

Data capture of the base information for this project was developed similarly to that for the Winnemucca District, Sonoma-Gerlach Resource Area Resource Management Plan project. Data not collected under the BLM contract was digitized at the Nevada State Office, the Surprise Resource Area, and the Winnemucca District Office. The automated resource data collection came from many sources, including the Branch of Mapping Sciences, Information Resource Management, the Service Center, the California Surprise Resource Area, and the Nevada Sonoma-Gerlach Resource Area. The data collected will help the Bureau offices in conflict analysis and assist the coalition with their proposal to Congress. This project is currently ongoing and should be completed for presentation to Congress sometime in FY 93.

Digital Line Graphs 1:100,000 Scale - Nevada entered into an agreement with USGS to finish the remaining Digital Line Graphs within Nevada. Nevada provided the funding and USGS will provide the quality control and quality assurance. The project is scheduled for completion by September 30, 1993.

Digital Line Graph Data Conversion - Nevada has been working with the Service Center in testing data conversion from Digital Line Graph to the Automated Digitizing System. Nevada has also been working with USGS in attributing major/minor codes in preparation for conversion of data from Automated Digitizing System/Map Overlay Statistical System to Digital Line Graph. The process has been working efficiently.



Steve Rasmussen

Land Status (Ownership) 1:100,000 Scale - Nevada entered into an agreement with Utah State University in cooperation with the U.S. Fish and Wildlife Service to digitize ownership data for Nevada. The data should be available sometime this fiscal year.

Wilderness Study Area Map - Nevada has collected data for 78 Wilderness Study Areas covering 339 1:24,000-scale quadrants. The next phase is to merge, create files, and plot this data at 1:63,360 and 1:100,000 scales. This will make all the Wilderness Study Area boundaries consistent with each other.

Electrostatic Plotter - Nevada is acquiring experience in the use of an electrostatic multicolor plotter. This machine will be used by the Nevada Mining Claim Imaging System, the Branch of Mapping Sciences, and the Branch of Information Resource Management.

AutoCAD - This software was purchased to assist in the conversion of manual mapping processes to automated processes.

Resource Management Plans & Amendments - The Branch developed base maps and resource themes for six Resource Management Plans and/

or amendments at 1:250,000 scale that were photographically reduced for publication in reports. The projects included the Las Vegas, Stateline Resource Management Plan (76 maps), Elko Fluid Minerals Amendment (10 maps), Egan Oil/Gas Amendment (10 maps), Tonopah Resource Management Plan (63 maps), Nellis Air Force Range Proposed Resource Plan and Final Environmental Impact Statement (9 maps), and Wells Resource Area Wild Horse Amendment (6 maps). The range of maps used in each report varied depending on the complexity of the information to be portrayed.

Photogrammetry

Ongoing Projects - Last fiscal year Nevada planned a total of five photogrammetry projects, which are presently being developed through the Service Center.

Line Trace Plus Work Stations - Nevada has purchased three 486 microcomputers with UNIX and installed the Line Trace Plus software to process Digital Elevation Models.

Remote Sensing

Aerial Photography - In the late 1970's, Nevada had a major drive to collect aerial photography for each of its 12 Resource Areas. This aerial photography was flown for field office resource data collection. The last major aerial photography contract was flown in 1981. Since that project, Nevada's aerial photography program has had limited activity. Most of the aerial photography is flown for riparian projects or for engineering building sites.

Digital Image Processing - Digital Image processing (SPOT) in Nevada has also been limited. This data is processed through the Service Center and has been very successful in Nevada. The Ely District has used the data and is very pleased with the end mapping products. Nevada will review applications in the future.

New Mexico

Cartography

Bob Bewley

Land Ownership Status Mapping Plan - In 1992 the Mapping Sciences Section developed the *New Mexico Land Ownership Status Mapping Plan*. This plan defines procedures for the creation, maintenance, and distribution of land ownership status maps in New Mexico. This includes maps published at the 100k, 500k, and 1:1,000,000 scales. The 100k mapping procedures have changed dramatically with the reorganization of the New Mexico Operations Staff and the switch to contracted sales of 100k maps at the State Office.

State-Base Land Ownership Map Update - An effort to update and reprint the state-base surface land ownership status maps is now in progress. This project is a cooperative effort between the New Mexico State Office and the Service Center. The Service Center is scanning 100k map separates that will be merged into a single statewide map using Line Trace Plus, Automated Digitizing System, and Map Overlay and Statistical System software. The New Mexico State Office is hoping to have new maps printed at 500k and 1:1,000,000 by December 1993. A notable spinoff of this project will be the creation of a land ownership status data base which will be used in the future to update the 100k status maps.

Geographic Information Systems Support

Geographic Information System Data Management Plan - Policy and procedures have been developed. The plan has been approved and is in effect.

Statewide Data Capture at 1:24,000 - Statewide coverage of the Public Land Survey System, surface ownership status, and Areas of Critical Environmental Concern has been completed. Several State agencies are assisting BLM in the data collection, parcel generation, and quality control steps for this project. In return, completed data themes will be released to the many different agencies who need this information.

Miscellaneous Projects - Additional ongoing or recently completed Geographic Information System projects include the Roswell Resource Management Plan, Range Case Files Automation Project, Desert Bighorn Sheep Habitat Evaluation, update of coal data themes, and mapping of potential BLM/Bureau of Reclamation land exchange tracts.

Training - Six Geographic Information System training sessions and the annual Geographic Information System workshop were provided for New Mexico field offices during FY 92. Similar courses were offered in various locations to maximize the number employees able to attend.

Remote Sensing/Photogrammetry

Remote Sensing Policy Document - Draft policy and procedures have been developed. The plan is currently being reviewed.

Equipment Acquisition - A Sun Sparc II workstation was acquired early in the fiscal year and is being used for several satellite imagery projects.

Data Base Development - Work on developing a comprehensive spatial data base (Global Positioning System, Geographic Information System, and satellite imagery) has been started for the Fort Stanton, Ladrone Mountains, and King Ranch areas. Aerial photography for riparian projects has been acquired and is currently being used for riparian inventory and analysis. The State Office's archive of aerial photographs, orthophotos, photo mosaics, and flight line maps has been partially reorganized.

BLM/Automated Land and Mineral Record System (ALMRS) Prototype Project - Four scenes were procured from SPOT and merged into a single image. Eighty separate 7-1/2-minute quadrangle files are being produced from this data for the oil and gas portion of the ALMRS Prototype Project.

Oregon

Cartography

Wild and Scenic Rivers Process - The Federal Omnibus Oregon Wild and Scenic Rivers Act of 1988 designated 40 river segments in Oregon for inclusion in the Wild and Scenic Rivers system. Development of management plans for each designated river segment have been initiated. The Mapping Sciences Section has created map bases and generated maps showing the various environmental assessments and draft management plans in support of the documents produced. Maps for the Upper Deschutes/Lower Crooked Rivers, Grande Ronde River, and North Fork Crooked River plans were developed to depict land administration, administrative boundaries and alternatives, and recreation development (proposed and existing).

BLM Spotted Owl Exemption Team - BLM requested an exemption under the Endangered Species Act to put 44 timber sale areas up for bid. In support of the court case presentation, the Mapping Sciences Section gathered photographic mosaics, section line overlays, ownership overlays, and digital plots of the sale parcels. All data was scaled and composited into a set of large display diagrams and a set of small handouts.

Ted Albert

Resource Management Plans and Progress Reports - The majority of the Oregon/Washington planning documents are compiled in the traditional cartographic format using existing base separates of either 30-minute quadrangle, 100k quadrangle, or 500k. The Burns District and Baker Resource Area plan progress reports were revised and printed using previous document bases. As the opportunities have arisen, the Automated Digital System/Map Overlay and Statistical System digital data has been converted to AutoCAD, or when time allows, simple base maps have been digitized in AutoCAD. The Western Oregon Resource Management Plan/Draft Environmental Statements for the Coos Bay, Lakeview, Eugene, Roseburg, Salem, and Medford Districts were generated using the 500k Automated Digitizing System/Map Overlay Statistical System base themes. The resource theme data was extracted from the Western Oregon Digital Data Base and digitized in AutoCAD from hard-copy overlays.

Law Enforcement - Two cases involving illegal timber harvesting and the growing of illegal drugs on BLM-administered lands were brought to trial. Several enlargements of aerial photography and delineation of boundaries and ownership overlays were required for court exhibits.

Recreation 2000 and Fish & Wildlife Programs - Oregon and Washington are involved with outreach programs to improve BLM's visibility to the public. A series of recreation maps at 1/2-inch-to-a-mile scale have been initiated, and in FY 92, the Medford District and Eugene District cartographic work was completed. An Oregon/Washington handout map was reprinted and will be used for distribution at fairs and sport shows.

Oregon Department of Tourism - The Oregon Campground Guide was a cooperative project led by the Oregon Department of Tourism with BLM, U.S. Forest Service, and Oregon State Parks. The purpose of the guide was to provide information to residents and visitors on the many public campgrounds and other points of interest available throughout Oregon. The Mapping Sciences Section reformatted the Oregon Department of Transportation base separates and added a grid and symbols for the sites. The U.S. Forest Service developed the matrix. All reproduction of proofing materials and final press negatives was done by BLM.

Steens Mountain Cooperative Project - This is a cooperative agreement between BLM and USGS. The area in question is in the Steens Mountain region, covers 43 7-1/2-minute quadrangles, and is a proposed National Conservation Area. The DLG-3 format digital data will be produced through a contract issued by the Service Center. USGS will provide quality control for this data to make sure that it meets their standards for entry into the National Digital Cartographic Data Base. In exchange for this data, USGS will build high resolution orthophoto quadrangles. Quality control will be provided by the Oregon State Office to ensure that BLM standards are met. The DLG-3 data will be in the categories of topography, transportation, surface hydrography, and cultural infrastructure features, and will be used as resource base data in the land information system.

Photogrammetry

Photogrammetric Projects, Stereo Compilation - This work included computation of digital base map data and topography using a Kern PG-2 analog stereoplotter. The geographic area of coverage and the number of stereo models produced to provide coverage for each area are as follows: Yaquina Head Outstanding Natural Area, 2 models; North Spit, 20 models; Steens South Loop Campground (Burns), 3 models; Western Oregon Digital Data Base Project, 1 model tie and update work for Idaho, which included Hawkins Reservoir, 3 models; Cove Recreation Site, 3 models; and Salmon Falls Recreation Site, 3 models. These jobs ranged in size from approximately 5 acres to 10 square miles and 1-foot to 20-foot contour intervals.

Photogrammetric Digital Work - A digital data base was produced for a large-scale (Coos Bay District) aerial photo project. This included plotting the land ownership, photo coverage, and boundaries of the required areas for BLM and the nine participators in the project.

Remote Sensing

Cyclic Aerial Photography - Each year, the remote sensing component of Mapping Sciences plans and makes provisions for capture and printing of aerial photography for one of the western Oregon Districts. This year, the production area was the Coos Bay District. This job included approximately 3,900 linear miles of natural color aerial photography flown, and initially involved nine participators who provided a contribution of $50,000. It is estimated that 40,000 prints will be produced for this job. In addition, contracted color photo printing for the Medford District, which produced approximately 26,200 prints, was completed.

Satellite Imagery Technical Procedures Evaluation Committee - The Mapping Sciences' Remote Sensing Specialist was a representative on this committee, and reviewed potential vegetation mapping from satellite imagery. While visiting the NASA facility at Moffit Field, California, the potential sharing of data and technical capabilities was discussed.

Aerial Photography

Contracted Aerial Photo Projects - Color aerial photography was flown over various sites within the Burns and Lakeview Districts for mapping, planning, and archeological projects. A total of eight project areas were flown. Approximately 100 linear miles of natural color aerial photography were flown over riparian areas in the Vale District, and color infrared was used for special project zones along stream segments.

Balloon-Held Camera System - This field work employed the use of a tethered balloon-held

70-mm camera. These small-scale projects included Gap Ranch and Skull Creek Dunes in the Burns District. The actual camera used was a Pentax 645 loaded with 70-mm color film. There were approximately 400 prints produced for these projects.

Exhibit Materials, Legal and Presentation - A major effort was the coordination and production of photo mosaics for the Spotted Owl Exemption Team, involving a total of 73 photo products. Research and production of aerial photo products and related survey information was used for timber trespass cases and ownership investigation in Oregon and Washington. Photo orders included products for the planning of reclamation and rehabilitation of a uranium mine site on the Indian Reservation in Spokane, Washington. Much of the above work will continue in FY 93.

Resource Management Projects - Site-specific color infrared aerial photography was acquired for forestry rehabilitation in the Baker Resource Area.

Mapping Survey Work - Verification of a level line at Yaquina Head, Oregon, was completed. This area has been designated as an Outstanding Natural Area. Advice and coordination were provided for survey and paneling control points for project sites in the Burns District for campground, administrative, and interpretive center sites.

Other - Various photo enlargements and mosaics were ordered and/or produced for the Districts. The horizontal and vertical control for the Grande Ronde River corridor was established.

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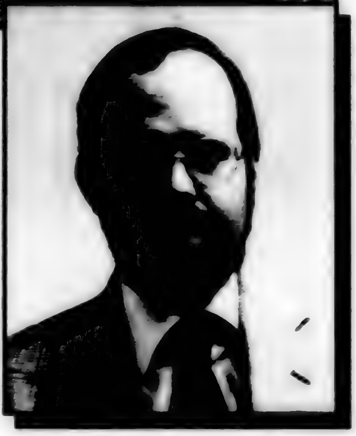
Utah

Cartography



Don Gray

Resource Management Plan Support - During FY 92 the Automated Unit was heavily committed to the collection and revision of data for Geographic Information System-produced Resource Management Plans. The Automated Unit worked with District Offices to process and correct data for published maps on three Resource Management Plans (Diamond Mountain final, Henry Mountain and Dixie drafts). These Resource Management Plans were due to be published in FY 92. Initial collection of base data and resource themes proceeded on the Kanab-Escalante Resource Management Plan, and the collection strategy for the Grand Resource Management Plan, which is due in FY 93, was completed.

Mapping Sciences is now identified as the organization responsible for collecting and maintaining resource base data. To improve the collection process, they worked with the digitizing staff to produce a user-friendly Automated Digitizing System training manual. In addition, staff members traveled to the Richfield District to provide direct training to District personnel involved in the Henry Mountain Resource Management Plan.

Resource Management Plan Mapping - The Traditional Cartography Staff cooperated closely with the Automated Unit to improve the Map Overlay Statistical System-to-AutoCAD translation, attributing, and plotting procedures used to produce page-size and large-format Resource Management Plan maps. A program management approach was implemented, which greatly enhanced production processes and tracking of Resource Management Plan mapping.

Wilderness Mapping - Eighty-three Congressional Wilderness Study Area maps were reviewed and corrected with District input. The Map Overlay Statistical System files were then edited and revised to agree with the Congressional maps. This last step in the wilderness map process ensured that hard-copy maps and Geographic Information System data agreed.

Off-Highway Vehicle Map Series - Traditional Cartography worked with the Utah State Office Recreation Staff, Utah State Parks and Recreation Division, and U.S. Forest Service Region 4, to develop a statewide, 100k-based, off-highway vehicle map series. All participants worked to reach consensus on map information and format. Prototype off-highway vehicle maps were developed for review and further refinement by the participating agencies. Actual production of these maps should commence in FY 93.

Map Maintenance and Revision - BLM and Utah State Lands and Forestry records were used for an update of ownership for a revised 1:500k state land status map. Actual production will commence once Resource Management Plan mapping is finished, and is targeted for completion in FY 93.

Geographic Information System Interaction - Mapping Sciences started a cooperative effort with the Branch of Information Services to develop a new Geographic Information System implementation plan for Utah. The principal goals were to improve the current Resource Management Plan-based program and to define a strategy to make

Geographic Information Systems a major contributor to resource management at the District level. Definition of roles and responsibilities between Geographic Information Systems and Mapping Sciences improved working relations and efficiencies between the two activities.

Photogrammetry

Transportation Net/Recreation Sites - Early in FY 92 the Utah State Office received a surplus second-order plotter (Kern PG-2) and reactivated a third order plotter suitable for resource work. Based on requests from two Districts, these plotters were put to use updating the transportation net for Resource Management Plan mapping. Mapping Sciences served as coordinator for procurement of aerial photography and stereo compilation of 2-foot contour site plan maps for seven recreation sites within Utah. Two more site plans are in the works.

Remote Sensing

Image Processing - The Utah State Office received delivery of an image processing station and moved into a training/production mode. Initial products were fire fuels and Resource Management Plan vegetation maps produced from AVHRR and Landsat imagery. Field support missions were identified, and an outreach program to inform Districts of remote sensing capabilities was initiated at Moab in July.

Cooperative Efforts - Remote sensing activities are based on cooperative efforts with other agencies and universities. This includes work with the Forest Service National Forest Applications Program on videography applications. A riparian and recreation area in the West Desert was flown and results were evaluated. There appears to be great promise for efficient field inventory and other applications. The videography from this project has been requested by other BLM organizations for evaluation.

Wyoming

Cartography

Map Series - BLM in Wyoming has always been very supportive in the discipline of creating maps that can be used by the Government and enjoyed by the public. To date the 1:100,000-scale surface and mineral status maps have been a greatly distributed map series. Wyoming has always contributed to the development of this map series, which has been standardized for publication. Currently 5 maps per year are revised and approximately 20 to 25 maps without revisions are reprinted each year. In FY 92, BLM Wyoming sold over 25,000 of these maps through the public room sales offices. Another popular map series, the recreation maps, was reprinted with 85,000 copies distributed in FY 92.

Resource Management Plans - The Mapping Section supported three Resource Management Plans during FY 92. The information was collected at the field level and then either manually drafted or automated into working documents. One Resource Management Plan is now complete, one is being prepared for draft, and another is just being completed for analysis using the Geographic Information System. Automation of the data is ongoing and is overwhelmingly accepted by the field for data capture, analysis, map production, and data storage for oil and gas, coal, wetlands, soils data, etc.

Bruce Keating

Engineering Documents - The engineering documents required for contract work are completed by the Technographics Section using AutoCAD software. This data automation has brought about tremendous time savings as opposed to manual drafting.

Photogrammetry

Product Verification Measurement System - The Branch of Engineering and Support Services purchased an upgrade to the coal Product Verification Measurement System, which uses HASP software application packages. The Product Verification Measurement System is used for the production of terrain models for approximately 12 coal mines on a quarterly basis. In addition, terrain models are produced each year for numerous roads, recreation sites, trespass sites, and engineering projects on an as-needed basis.

Digital Elevation Models - Approximately 75 percent of BLM-administered lands in Wyoming have 30-meter Digital Elevation Model coverage on file at both the Wyoming State Office and the Service Center. For areas without Digital Elevation Model coverage, the Service Center is creating Digital Elevation Models on a priority basis. Although the Digital Elevation Models are most frequently used to generate slope and aspect maps for Resource Management Plans, Wyoming is also using Digital Elevation Models to create viewshed maps.

Remote Sensing

Thematic Mapper Imagery - Landsat Thematic Mapper imagery is being used by Wyoming field offices to generate land cover (vegetation) maps for Resource Management Plans. For example, the Service Center assisted Wyoming in acquiring, processing, and generating image maps for digital classification of the Grass Creek Resource Area. Thirty-meter Digital Elevation Models were used to generate slope and aspect classes for the entire Resource Area. These digital files were then imported into the Map Analysis Package for inclusion in the Resource Management Plan process using the Geographic Information System. In addition, BLM Wyoming assisted the University of Wyoming in acquiring Thematic Mapper imagery to create vegetation maps for the GAP Analysis of Biodiversity. GAP vegetation data covering the Buffalo Resource Area will be imported into the Map Analysis Package for inclusion in the Buffalo Resource Management Plan.

Other Projects - Additional remote sensing activities include flying large-scale photography of engineering project sites and streams for riparian analysis in remote regions of the southern Bighorn Mountains.

Program Leadership

Individuals on the following list may be contacted for details on the products and services provided through the BLM mapping sciences program.

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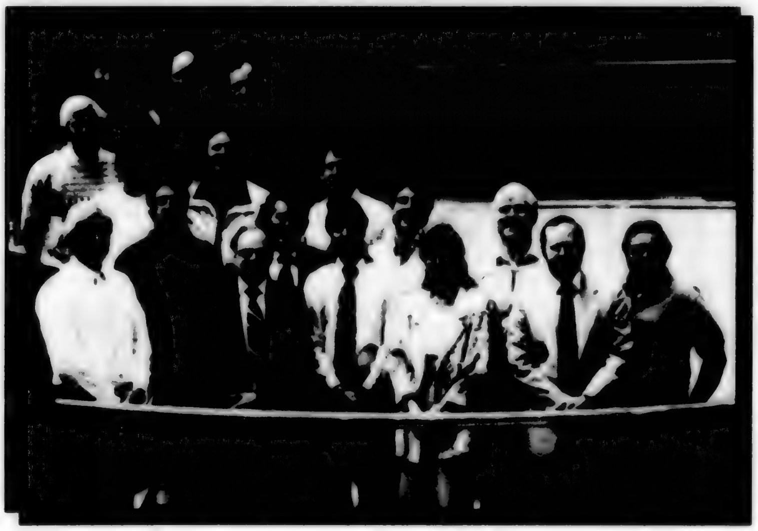

Mapping Sciences Workshop, Anchorage
June 1992

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To the recipients of this document:

This is the first edition of the BLM Mapping Sciences Summary. We invite your evaluations, opinions, and comments so that we may improve future versions. Our goal is to make the summary as useful, informative, and reader-friendly as possible. Please take the time to answer the following questions. Then remove this page and return it to the address printed on the other side. Thanks for helping us out!

1. Did the summary contain information that was useful to you?

☐ Yes ☐ No

2. Was the summary organized for easy use?

☐ Yes ☐ No If no, how could it be improved?

3. Were descriptions of services clear and easy to understand?

☐ Yes ☐ No

4. Was the level of detail in the descriptions appropriate?

☐ Too little ☐ Appropriate ☐ Too much

5. Did the summary contain information on services of which you were previously unaware?

☐ Yes ☐ No If yes, what were they?

6. Was the summary missing any information you would like to see included?

☐ Yes ☐ No If yes, what?

7. Please rate the summary on the following:

	Poor	**Fair**	**Good**
Clarity of explanations			
Comprehensiveness			
Ease of use			
Level of detail			
Organization of information			
Usefulness of information			

Cut Here

Fold on the dotted lines and mail to the address below

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Bureau of Land Management
Service Center (SC-140)
Building 50, Denver Federal Center
P.O. Box 25047
Denver, CO 80225-0047

END

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